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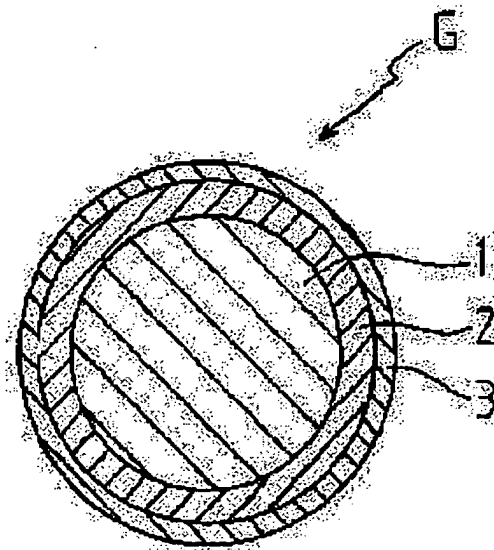
(72)Inventor : YAMAGISHI HISASHI
HIGUCHI HIROSHI
HAYASHI JUNJI

(54) GOLF BALL

(57)Abstract:

PROBLEM TO BE SOLVED: To provide a golf ball having soft and comfortable ball hit feeling and remarkably improved in durability at the time of continuous hitting.

SOLUTION: A golf ball includes a core 1, an intermediate layer formed by one or two layers enveloping the core, and a cover 3 mainly composed of thermoplastic resin for covering the intermediate layer, wherein the core is mainly composed of a rubber base material, when 100 kg of load is applied, the deformation amount is 3.0 mm or more, an inorganic filler is added to at least one layer of the cover and the intermediate layer, and the specific gravity of the cover is 1.0-1.3.



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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention relates to the golf ball which endurance has improved substantially while having a good feeling of a hit ball by carrying out optimum dose addition of the inorganic bulking agent in the interlayer who consists of a layer more than covering and one layer, or a bilayer.

[0002]

[Description of the Prior Art] From the former, many techniques of adding an inorganic bulking agent to covering material are proposed (JP,5-73427,B, JP,6-277312,A, JP,57-25867,A, 60-210272 official report, etc.).

[0003] Especially, by adding inorganic bulking agents, such as a titanium white and a barium sulfate, to covering material, shift the gravimetric analysis within a ball from a core core to a covering side, enlarge moment of inertia of the ball itself, and control attenuation of the spin under flight, consequently the initial spin at the time of a stroke stops being able to start easily, and flight distance can be enlarged at JP,6-277312,A.

[0004] However, fundamentally, each of these proposals makes the moment of inertia of a ball increase by the increase in specific gravity of covering, and if an inorganic bulking agent is put into covering material too much for the purpose of raising the flight distance engine performance, they will spoil the resilience and crack endurance of a ball on the contrary.

[0005] On the other hand, commodity value will be spoiled, if the comfortable feeling of a hit ball at the time of a stroke is an indispensable element and a golf ball does not have this.

[0006] For this reason, many various devices were proposed in order to improve a feeling of a hit ball, but when a soft feeling of a hit ball was obtained under the criteria of the conventional technique, it was very difficult [it] for the endurance in a continuation stroke to fall and to, have simultaneously improvement in the endurance in a good feeling of a hit ball, and a continuation stroke on the other hand.

[0007] This invention was made in view of the above-mentioned situation, and the place made into the object is located in the place which offers the golf ball which can aim at improvement in the endurance in the time of a good feeling of a hit ball, and a continuation stroke by forming in the perimeter of a soft core the middle class and covering which consist of one layer which carried out optimum dose addition of the inorganic bulking agent, or more than a bilayer.

[0008]

[The means for solving a technical problem and the gestalt of implementation of invention] this invention person did the knowledge of having a soft feeling of a hit ball, and the outstanding continuation stroke endurance in the golf ball equipped with the middle class who consists of a layer more than one layer which surrounds a core and this core, or a bilayer as a result of repeating examination wholeheartedly, in order to attain the above-mentioned object, and covering which uses as a principal member the thermoplastics which covers this middle class by adding the inorganic bulking agent of optimum dose to covering and the middle class.

[0009] Namely, it sets to the golf ball equipped with a core, the middle class who consists of a layer more than one layer which surrounds this core, or a bilayer, and covering which uses as a principal member the thermoplastics which covers this middle class. While the above-mentioned core uses a rubber base material as a principal component and the deformation at the time of the 100kg load load is 3.0mm or more the above-mentioned covering and the middle class are further alike at least, and an inorganic bulking agent is added, and the specific gravity of the above-mentioned covering is 1.0-1.3 -- It forms preferably with an interlayer's resin constituent which contains [as opposed to / much more / at least / a resinous principle and this resinous principle 100 weight section] an inorganic bulking agent 5 - 40 weight sections. This interlayer's specific gravity by forming 1.0-1.3, and thickness in 0.5-6.0mm While the feeling of a hit ball at the time of a stroke is soft and the core formed softly, and the middle class and covering which carried out

optimum dose addition of the inorganic bulking agent have it, without acting also unexpectedly in multiplication and spoiling ball appearance nature, [comfortable] A header and this invention are completed for the golf ball excellent in the endurance at the time of a continuation stroke being obtained.

[0010] In addition, this invention is not a thing aiming at adding an inorganic bulking agent to covering material, making the moment of inertia of a ball increase by carrying out an increase in specific gravity of the covering like the conventional technique, and raising the jump engine performance. By combining the middle class and covering more than one layer which made homogeneity distribute a soft core and a soft inorganic bulking agent in a proper amount, or a bilayer which were multilayered These act in multiplication and aim at obtaining the golf ball which has the outstanding endurance in the good feeling of a hit ball and continuation stroke which are not until now.

[0011] Therefore, this invention is set to the golf ball equipped with (1) core, the middle class who consists of a layer more than one layer which surrounds this core, or a bilayer, and covering which uses as a principal member the thermoplastics which covers this middle class. While the above-mentioned core uses a rubber base material as a principal component and the deformation at the time of the 100kg load load is 3.0mm or more the golf ball which the above-mentioned covering and the middle class are further alike at least, and an inorganic bulking agent is added, and is characterized by the specific gravity of the above-mentioned covering being 1.0-1.3, and the (2) above-mentioned middle class -- with a resinous principle further at least The golf ball given in (1) which contains an inorganic bulking agent 5 - 40 weight sections to this resinous principle 100 weight section, (3) (1) whose specific gravity of the above-mentioned middle class is 1.0-1.3, or a golf ball given in (2), (4) The golf ball and the (5) above-mentioned covering of (1), (2), or 0.5 - (3) publication which is 6.0mm Resinous principle, [the above-mentioned middle class's thickness] The golf ball of (1) which contains an inorganic bulking agent 5 - 40 weight sections to this resinous principle 100 weight section thru/or (4) given in any 1 term is offered.

[0012] When lessons is taken from this invention and it explains in more detail hereafter, the golf ball G of this invention With the interlayer 2 (drawing 1 shows the case where an interlayer is a monolayer) multilayered more than one layer (monolayer) which surrounds a solid core 1 and this solid core 1 as shown in drawing 1 , or a bilayer It is constituted by the multilayer structure which has the covering 3 which covers this middle class 2, and the middle class reaches further at least and optimum dose addition of the inorganic bulking agent is carried out at covering so that it may mention later.

[0013] Although the above-mentioned solid core 1 can form polybutadiene rubber, polyisoprene rubber, natural rubber, and the base material rubber that uses silicone rubber as a principal component from the rubber constituent used as a principal member, in order to raise especially the resilience, its polybutadiene rubber is desirable. As polybutadiene rubber, it is cis- [which has cis- structure at least 40% or more] . - 1 and 4-polybutadiene is suitable. Moreover, although natural rubber, polyisoprene rubber, styrene butadiene rubber, etc. can be suitably blended with the above-mentioned polybutadiene by request into this base material rubber, since the resilience of a golf ball can be raised by making [many] a polybutadiene rubber component, it is desirable [rubber components other than these polybutadienes] to carry out to below 10 weight sections to the polybutadiene 100 weight section.

[0014] Although ester compounds, such as zinc salt of unsaturated fatty acid, such as methacrylic-acid zinc and acrylic-acid zinc, magnesium salt, and trimethyl propane methacrylate, etc. can be blended with the above-mentioned rubber constituent as a cross linking agent in addition to a rubber component, acrylic-acid zinc can be especially used suitably from the height of the resilience. As for the loadings of these cross linking agents, it is desirable that it is 15 - 40 weight section to the base material rubber 100 weight section.

[0015] Moreover, into a rubber constituent, vulcanizing agents, such as the dicumyl peroxide, 1, and 1-screws (tert-butyl peroxide) 3 and 3 and a 5-trimethyl cyclohexane, are blended, and the loadings of this vulcanizing agent can usually be made into 0.1 - 5 weight section to the base material rubber 100 weight section.

[0016] Being able to blend a zinc oxide, a barium sulfate, etc. with the above-mentioned rubber constituent as an antioxidant or a bulking agent for specific gravity adjustment if needed further, the loadings of these bulking agents are the 0 - 130 weight section to the base material rubber 100 weight section.

[0017] The suitable embodiment of the rubber constituent for cores in this invention is as being shown below.

[0018]

Cis- - 1, 4-polybutadiene The 100 weight sections Zinc oxide 5 - 40 weight section Acrylic-acid zinc 15 - 40 weight section Barium sulfate 0 - 40 weight section Peroxide 0.1 - 5.0 weight section The 1 and 1-screws (tert-butyl peroxide) 3 and 3, 5- Trimethyl cyclohexane 0.1 - 5.0 weight section Antioxidant Optimum-dose vulcanization conditions: Perform vulcanization for 5 - 20 minutes on 150**10-degree C conditions preferably.

[0019] and the compound which kneaded the above-mentioned rubber constituent for cores using the usual kneading machines (for example, a Banbury mixer, a kneader, a roll, etc.), and was obtained -- a core -- public funds -- it forms

with injection shaping or compression shaping using a mold.

[0020] thus, the obtained solid core -- the diameter -- desirable -- 28-38mm -- more -- desirable -- 30-37mm -- it is -- specific gravity -- desirable -- 1.05-1.25 -- it is 1.07-1.23 more preferably.

[0021] Moreover, the deformation at the time of 100kg load of a core needs to be 3.0mm or more, and is 3.3-7.0mm more preferably 3.0-8mm. By less than 3.0mm, a core becomes [the deformation of a core] hard too much, and the feeling of a hit ball at the time of a stroke becomes hard, and it becomes impossible to attain the object of this invention. On the other hand, if it exceeds 8mm, a core will become soft too much, and the resilience may be reduced remarkably. In addition, a core is good also as monolayer structure which consists of one kind of ingredient, and it does not matter as multilayer structure which consists more than of a bilayer which carried out the laminating of the layer which consists of an ingredient of a different kind.

[0022] the perimeter of that the above-mentioned interlayer 2 also forms in the perimeter of a core at a monolayer, or a core -- a multilayer -- it can also form in a bilayer or three layers preferably.

[0023] Although this interlayer uses thermoplastics as a principal component, for example, a polyester elastomer, ionomer resin, a styrene system elastomer, urethane system resin, hydrogenation butadiene resins, such mixture, etc. are mentioned, specifically, commercial items, such as "high milan" (made in [DEYUPON poly chemical company] Mitsui), "Surlyn" (Du Pont make), "Hytrel" (Du Pont-Toray make), and "panDEKKUSU" (Dainippon Ink & Chemicals, Inc. make), can be used.

[0024] It is desirable to use ionomer resin as a principal member here, especially in forming an interlayer in the perimeter of a core at a monolayer, and when carrying out bilayer (when 2nd interlayer is covered around 1st interlayer) formation of the interlayer around a core, to the 1st interlayer, it is desirable to use a polyester system elastomer softer than the 1st interlayer, a polyurethane system elastomer, etc. for the 2nd interlayer comparatively, using the ionomer resin of a high degree of hardness as a principal component.

[0025] In this invention, when an interlayer is the much more, an inorganic bulking agent is added to this interlayer. Moreover, when an interlayer is the two-layer structure, one layer of any inorganic bulking agents is added in both layers.

[0026] in this case, the resinous principle 100 weight section which forms the interlayer by whom this is added in an inorganic bulking agent -- receiving -- 5 - 40 weight section -- desirable -- 10 - 38 weight section -- 13-36 weight section addition is carried out more preferably. There is a case where the reinforcement effectiveness stops the addition of an inorganic bulking agent arising under in 5 weight sections. On the other hand, if 40 weight sections are exceeded, an adverse effect may appear in dispersibility or the resilience.

[0027] 0.1-10 micrometers of mean particle diameter of this inorganic bulking agent are 0.01-100 micrometers usually 0.1-1.0 micrometers more preferably. Even if too large [mean particle diameter is too smaller than the above-mentioned range, and], the dispersibility at the time of restoration is made to get worse, and the operation effectiveness of this invention may be unable to be attained.

[0028] Moreover, the specific gravity of an inorganic bulking agent is usually 2.0-6.0 preferably 6.5 or less.

[0029] As such an inorganic bulking agent, a barium sulfate (specific gravity 4.47 [about]), the titanium white (specific gravity 4.17 [about]) of a rutin mold, a calcium carbonate (specific gravity 2.6 [about]), etc. are mentioned, for example, it is independent or these one sort can be used combining two or more sorts.

[0030] In addition, to an interlayer constituent, dispersants, such as an antioxidant and metallic soap, etc. can also be added if needed.

[0031] As an approach of covering the above-mentioned middle class around a core, there is especially no limit and it can adopt usual injection shaping or usual compression shaping.

[0032] thus, an interlayer's fabricated specific gravity -- the whole -- 1.0-1.3 -- desirable -- 1.02-1.28 -- it is 1.05-1.26 more preferably.

[0033] Moreover, on the whole, the thickness of the layer by which the above-mentioned inorganic bulking agent was added is desirable, and an interlayer's thickness is 0.8-3.5mm more preferably 0.7-4.0mm, when it is 1.0-5.0mm more preferably 0.5-6.0mm and an interlayer is a multilayer more than a bilayer.

[0034] moreover, the Shore D degree of hardness when an interlayer is the much more -- 45-70 -- it is 55-70 preferably. In addition, when an interlayer is the multilayer structure more than a bilayer, it is desirable that much more Shore D degree of hardness is 55 or less at least.

[0035] Thus, covering is covered around [which consists of the middle class who blended the obtained soft core and the inorganic bulking agent] a spherule.

[0036] Although the above-mentioned covering 3 is formed from the covering material which uses thermoplastics as a principal member, for example, a polyester elastomer, ionomer resin, a styrene system elastomer, urethane system

resin, hydrogenation butadiene resins, such mixture, etc. are mentioned, especially ionomer resin is desirable and, specifically, "high milan" (made in [DEYUPON poly chemical company] Mitsui), "Surlyn" (Du Pont make), etc. are mentioned.

[0037] In this invention, optimum dose addition of the inorganic bulking agent is carried out also at covering. in this case, the resinous principle 100 weight section in which the addition of an inorganic bulking agent forms covering -- receiving -- 5 - 40 weight section -- it is 8 - 37 weight section preferably.

[0038] Things can be carried out using the thing same as such an inorganic bulking agent as the above-mentioned interlayer. In addition, to covering material, dispersants, such as UV absorbent, an antioxidant, and metallic soap, etc. can also be added if needed.

[0039] As an approach of covering the above-mentioned covering on the middle class, there is especially no limit and it can adopt usual injection shaping or usual compression shaping.

[0040] Thus, the specific gravity of fabricated covering is 1.0-1.3, and is 1.03-1.28 preferably.

[0041] moreover, the thickness of covering -- desirable -- 0.5-2.5mm -- more -- desirable -- 0.8-2.3mm -- it is -- the Shore D degree of hardness of covering -- 45-70 -- it is 50-68 preferably. In addition, even if it forms covering in two or more layers chosen from a different ingredient, it does not interfere.

[0042] The endurance of the golf ball of this invention in a stroke improves by leaps and bounds by having the above configuration repeatedly with a soft comfortable feeling of a hit ball.

[0043] In addition, many dimples are formed in the front face, and the golf ball of this invention can perform finishing processing of paint, a stamp, etc. to a front face if needed. Moreover, it is 3.0-4.8mm more preferably 2.6-5.0mm in the deformation produced when the degree of hardness of the whole ball carries out the load of the load which is 100kg, and a ball diameter and weight can be formed in the diameter of 42.67mm or more, and the weight of 45.93g or less according to the golf regulation of R&A.

[0044]

[Effect of the Invention] According to this invention, the golf ball whose endurance at the time of a soft comfortable feeling of a hit ball and a continuation stroke improved by leaps and bounds is obtained with the combination of a soft core, and the middle class and covering which carried out optimum dose addition of the inorganic bulking agent.

[0045]

[Example] Although an example and the example of a comparison are shown and this invention is explained concretely hereafter, this invention is not restricted to the following example. In addition, all of the loadings of tables 1 and 2 are the weight section.

[0046] [an example and the example of a comparison] -- the rubber constituent for cores of a combination formula shown in a table 1 -- a kneader -- kneading -- a core -- public funds -- the solid core of an example and the example of a comparison was created by vulcanizing for about 15 minutes at the temperature of 155 degrees C within a mold.

[0047] Coat formation of the middle class material and covering material which were shown in a table 2 around the obtained core was carried out with injection molding in the combination of a table 3, and the solid golf ball of examples 1-4 and the examples 1 and 2 of a comparison was created. In addition, the example 2 of a comparison is a two-piece golf ball which consists of a core without the middle class, and covering.

[0048] Subsequently, a core degree of hardness, continuation stroke endurance, a feeling of a hit ball, and appearance nature were measured by the following approach about the obtained golf ball. A result is written together to a table 3. The deformation (mm) when carrying out a load expressed 100kg load with the core degree-of-hardness core.

After repeating the ball on condition that head speed 45 m/sec and hitting it using a continuation stroke endurance swing robot with a driver (11 J's World Stage loft angles (the Bridgestone sport incorporated company make)), the count of a stroke compared relatively the generating condition of the crack on the front face of a ball.

O : -- completely -- problem-less O : -- **with generating: of a crack -- the following criteria estimated the feel when real-**(ing) comparatively by four feeling professional golfers of an early destructive x:early destructive hit ball.

O : -- soft comfortable O:fitness **: -- a little hard x: -- connivance observation of the condition on the front face of a ball after hard appearance nature shaping was carried out, and the following criteria estimated.

O : -- very -- fitness O:fitness **: -- a little bad x: -- [0049] [bad]

[A table 1]

		実 施 例				比較例	
		1	2	3	4	1	2
ソ リ ン ド コ ア	ス-1,4-ジブチルジエ ン	100	100	100	100	100	100
	アクリル酸亜鉛	18.3	16.7	16.0	15.9	17.7	26.0
	ジクシパーオキサイド	0.6	0.6	0.6	0.6	0.6	0.6
	1,1-ビス(4-ブチル)エ ン						
	3,3,5-トリブチルカ ド	0.6	0.6	0.6	0.6	0.6	0.25
	老化防止剤	0.2	0.2	0.2	0.2	0.2	0.2
	酸化亜鉛	5.0	5.0	5.0	5.0	5.0	10.0
	硫酸バリウム	19.5	10.9	25.5	17.6	34.2	5.2
	直径 (mm)	32.7	32.7	32.7	35.7	32.7	38.7
	硬度 (mm)	5.5	6.0	6.0	6.0	5.5	2.9

[0050]

[A table 2]

	A	B	C	D	E	F	G	H	I
ハイミラン1706*1	5.0						5.0		5.0
ハイミラン1605*1	6.0						6.0		5.0
ハイミラン1650*1		5.0				4.0			
サーリン 1856*2		5.0				6.0			
ハイトレル4047*3								1.00	
バンデックスEX7890*4				1.00					
ハイトレル3078*3			1.00		1.00				
チタン白	2.0	0.0	0.0	0.0	0.0	0.0	2.0	0.0	5.3
硫酸バリウム	13.8	28.3	12.6	6.8	2.6	28.3	0.0	0.0	19.0
硬度 (ショアD)	65	60	30	40	30	58	65	40	65
比重	1.05	1.15	1.18	1.25	1.10	1.15	0.98	1.12	1.13

* 1 : 三井・デュボンポリケミカル社製アイオノマー樹脂

* 2 : 米国デュボン社製アイオノマー樹脂

* 3 : 東レ・デュボン社製熱可塑性ポリエステルエラストマー

* 4 : 大日本インキ化学工業社製ポリウレタンエラストマー

[0051]

[A table 3]

		実 施 例				比較例	
		1	2	3	4	1	2
コア硬度 (mm)		5.5	6.0	6.0	6.0	5.5	2.9
中 間 層	材料種類	A	B	A	-	G	-
	比重	1.05	1.15	1.05	-	0.98	-
	厚み (mm)	1.5	1.5	1.5	-	1.5	-
	硬度 (ショアD)	65	60	65	-	65	-
	材料種類	C	D	E	F	H	-
	比重	1.18	1.25	1.10	1.15	1.12	-
	厚み (mm)	1.5	1.5	1.5	1.5	1.5	-
	硬度 (ショアD)	30	40	30	58	40	-
カ バ 	材料種類	A	A	A	A	G	I
	比重	1.05	1.05	1.05	1.05	0.98	1.13
	厚み (mm)	2.0	2.0	2.0	2.0	2.0	2.0
	硬度 (ショアD)	65	65	65	65	65	65
ボ ル	連続打撃耐久性	◎	◎	◎	◎	△	△
	打球感	◎	◎	◎	◎	◎	×
	外観性	◎	◎	◎	◎	◎	△

[0052] From the result of a table 3, since the specific gravity of covering is as small as 0.98, the example 1 of a comparison is inferior in the endurance in a continuation stroke, while only 2 weight sections contain an inorganic bulking agent in covering at the 2nd middle class excluding an inorganic bulking agent with the 1st middle class.

[0053] It is a two-piece ball which consists of a conventional core and conventional covering, and the example 2 of a comparison is very bad while it is inferior in the endurance and ball appearance nature in a continuation stroke. [of a feeling of a hit ball]

[0054] On the other hand, the ball of examples 1-4 is excellent in both the endurance in a continuation stroke a feeling of a hit ball and ball appearance nature by forming in the perimeter of a soft core the middle class and covering which added the inorganic bulking agent.

[Translation done.]

